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 HD **Carbon capture and storage: The dreams and setbacks in climate action; The International Energy Agency and the International Panel on Climate Change, along with numerous large and powerful traditional resource producers, say CCS projects are a necessary part of the global strategy**
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VANCOUVER

Call it a clash over carbon.

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Many environmentalists slam carbon capture and storage (CCS), saying it will perpetuate reliance on fossil fuels when the focus should be on spurring renewable energy sources of electricity, notably wind, solar and geothermal.

But the International Energy Agency and the International Panel on Climate Change, along with numerous large and powerful traditional resource producers, say CCS projects are a necessary part of the global strategy to reduce emissions of greenhouse gases such as carbon dioxide.

Industry analyst Jackie Forrest, senior director at Calgary-based ARC Energy Research Institute, said attaining the Canadian government's goal of "net-zero" emissions by 2050 will require a wide range of strategies, including continued innovation in CCS to help achieve carbon neutrality. "There's no way you're going to get to net zero without injecting CO₂ and storing it," Ms. Forrest said.

And as governments and energy producers wrestle with climate change now that economies are reopening from COVID-19 lockdowns, CCS is still very much part of the mix.

Despite a series of setbacks for CCS projects in North America, Europe and Australia in recent years, dreams of technological breakthroughs persist. There are ambitious startups trying to drive down the enormous costs per tonne of CO₂ captured and stored, and some of those startups have high-profile backers.

Burnaby, B.C.-based Svante Inc. is a prime example. The company has developed patented technology that captures CO₂ from smokestacks and last year, it announced a partnership with Lafarge Canada to test the technology at the global giant's cement plant in Richmond, B.C. The goal is to dramatically lower the capital costs of removing carbon from emissions.

In another collaborative venture, Svante teamed up with Husky Energy Inc. for a demonstration project built last year at the company's heavy oil operations near Lloydminster, Sask. Under the proprietary design, CO₂ molecules from flue gas adhere to a system of rotating filters made from engineered nanomaterials.

In the United States, like many providers, Svante is hoping new tax credits will help make new CCS technology more economically viable. The company recently embarked on a feasibility study for a cement plant in Colorado and teamed up with oil and gas giant Chevron Corp. for a pilot project in California.

"The piece that's missing in climate-change solutions is worldwide implementation of carbon capture and storage," said Svante CEO Claude Letourneau, who is a chemical engineer by training.

About 20 employees are assigned to Svante's research and development office in Burnaby. Another 60 work at a nearby manufacturing site and other locations.

North of Vancouver in Squamish, B.C., Carbon Engineering Ltd. is backed by investors such as Canadian Natural Resources Ltd. chairman Murray Edwards and Microsoft Corp. cofounder Bill Gates.

Carbon Engineering is developing technology to directly capture CO₂ from the atmosphere and store the colourless gas underground. Earlier this month, the company held a ground-breaking ceremony for the construction of its research centre and laboratory.

Adriaan Davidse, a director in the Toronto office at management consulting firm Deloitte Canada, said the COVID-19 crisis has underscored the need to combat climate change. The sharp decrease in economic activity worldwide during the pandemic reduced emissions, but certainly didn't eliminate them.

"It's not that easy to just stop the activity and grow the renewables," Mr. Davidse said.

Currently, there are 19 large-scale CCS facilities worldwide, four under construction and 28 in the development phase, according to the Global CCS Institute.

In Canada, just four large-scale CCS projects have been built so far: two in Alberta and two in Saskatchewan.

In the summer of 2008, the Alberta government announced a \$2-billion program that touted CCS as a crucial part of the province's strategy for climate action. The 2008-09 financial crisis and weakening oil prices in 2014, however, disrupted the province's lofty goals for slashing CO₂ emissions.

While Alberta scaled back its planned spending, the province still provided \$1.24-billion in funding to help get two CCS projects linked to its oil sands launched. The Quest project at the Scotford bitumen upgrader near Edmonton benefited from \$745-million in provincial funding commitments while Alberta Carbon Trunk Line's CO₂ pipeline received \$495-million.

Quest began operations in 2015, sequestering CO₂ in underground saline aquifers in Alberta, a project endorsed by the Canadian Oil Sands Industry Alliance.

Earlier this month, Wolf Carbon Solutions Inc. opened Alberta Carbon Trunk Line's 240-kilometre pipeline and injected CO₂ into Enhance Energy Inc.'s Clive oil field in central Alberta. An estimated 12 per cent of the pipeline's capacity to handle CO₂ is being used, leaving ample opportunity for future CCS projects to use the line. For now, CO₂ is piped from the Sturgeon diesel refinery and Nutrien Ltd.'s fertilizer facility in northern Alberta to old oil reservoirs in central Alberta for enhanced oil recovery.

In Saskatchewan, SaskPower's Boundary Dam project opened near Estevan in 2014, capturing carbon dioxide from a coal-fired power plant and injecting the CO₂ for enhanced oil recovery at Cenovus Energy Inc.'s Weyburn reservoir. Another Weyburn-Midale project by Cenovus dates back to 2000, and straddles the border with North Dakota.

Even with the enticement of government subsidies, however, there have been big setbacks for CCS. In 2012, TransAlta Corp. walked away from plans for decarbonization at a coal-fired electricity project west of Edmonton. In 2013, Swan Hills Synfuels Ltd. cancelled a proposal to incorporate CCS into underground coal gasification north of Edmonton.

In 2017 in Mississippi, the owners of the Kemper power plant scrapped plans to capture carbon from coal-fired generation. In Texas that same year, however, the Petra Nova coal-fired power plant opened with US\$190-million in grants from the U.S. government. Petra Nova captures CO₂ and stores it to squeeze more oil out of existing wells.

University of British Columbia science professor Greg Dipple said environmentalists have long been cynical about so-called “greenwashing” by companies that exaggerate claims of clean technology and sustainability.

“The big question is about how fast do you decarbonize our economy and our society and at what cost? CCS is a complicated space,” said Prof. Dipple, who works at UBC’s Department of Earth, Ocean and Atmospheric Sciences.

Greenpeace views carbon capture as a waste of time that keeps the planet hooked on fossil fuels, especially in cases when CO2 is used for sequestration and enhanced oil recovery.

But Jason Switzer, executive director of the Alberta Clean Technology Innovation Alliance, said more investment is needed in promising areas such as converting natural gas into hydrogen as a fuel source while sequestering CO2.

“All rowers need to be rowing in the same direction if we’re going to solve climate change,” said Mr. Switzer, a former managing director the Pembina Institute, a clean-energy think tank.

Back at Svante, the company is seeking more financing. Founded as Inventys Thermal Technologies Inc. in 2007 before changing its name last year, Svante has raised US\$75-million so far for its system that traps CO2 with specialized filters.

Husky Energy and Chevron are among the investors, as well as government agencies such as Sustainable Technology Development Canada. Svante wants to raise another US\$75-million by the end of this year.

Besides its own focus on capturing CO2 from flue gases emitted from smokestacks, Svante has partnered with Climeworks AG of Switzerland to collaborate on technology for removing carbon from the atmosphere through direct air capture.

“We’re taking innovation out of the lab and into commercial plants,” Mr. Letourneau said. “We’re cracking the code now to put partnerships in place to capture CO2 at low cost.”

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